



[4910-13]

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

[Docket No.: FAA-2021-0710; Notice No. 21-01]

#### Noise Certification Standards: Matternet model M2 aircraft

**AGENCY:** Federal Aviation Administration (FAA), Transportation (DOT).

**ACTION:** Notice of proposed rulemaking (NPRM), rule of particular applicability.

**SUMMARY:** The Federal Aviation Administration (FAA) proposes noise certification standards that would apply only to the Matternet model M2 quadcopter unmanned aircraft because there are currently no generally applicable noise certification standards for this aircraft.

**DATES:** Send comments on or before [Insert date **30** days after date of publication in the Federal Register]

**ADDRESSES:** Send comments identified by docket number FAA-2021-0710 using any of the following methods:

- **Federal eRulemaking Portal:** Go to <http://www.regulations.gov> and follow the online instructions for sending your comments electronically.
- **Mail:** Send comments to Docket Operations, M-30; U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE, Room W12-140, West Building Ground Floor, Washington, DC 20590-0001.
- **Hand Delivery or Courier:** Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

- Fax: Fax comments to Docket Operations at 202-493-2251.

*Privacy*: In accordance with 5 USC 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to [www.regulations.gov](http://www.regulations.gov), as described in the system of records notice (DOT/ALL-14 FDMS), which can be reviewed at [www.dot.gov/privacy](http://www.dot.gov/privacy).

*Docket*: Background documents or comments received may be read at <http://www.regulations.gov> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** For technical questions concerning this action, contact Hua (Bill) He, Federal Aviation Administration, Office of Environment and Energy, 800 Independence Ave. SW, Room 900 West, Washington, D.C. 20591; telephone (202) 267-3565; e-mail [hua.he@faa.gov](mailto:hua.he@faa.gov).

## **SUPPLEMENTARY INFORMATION:**

### **I. Authority for this Rulemaking**

The FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code. Subtitle I, section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

This rulemaking is issued under the authority described in subtitle VII, chapter 447, section 44715. Section 44715(a)(3) states that an original type certificate for an aircraft may be issued only after the Administrator of the FAA prescribes noise standards and regulations under that section that apply to the aircraft. This regulation is within the scope of that authority.

## **II. Need for this Rulemaking**

Section 44704 of Title 49 of the United States Code requires that the FAA issue a type certificate to an applicant that presents a qualified design. Section 44715(a)(3) requires the FAA to prescribe noise standards for an aircraft before a type certificate may be issued.

The current noise standards are contained in 14 CFR part 36. Within part 36, aircraft are distinguished by type, including jet airplanes, large turboprop airplanes, small airplanes, helicopters, and tiltrotors. When the FAA began issuing type certificates for unmanned aircraft (UA) several years ago, it used the noise standards for the type of manned aircraft that was most like the UA seeking type certification and that were compatible with the type classification. In the first two certifications, the FAA applied the small airplane standards under subpart F and appendix G. The small helicopter standards of subpart H and appendix J might also be found as applicable based on the design of an aircraft presented for certification.

The increase of low-altitude UA operations, and the increased demand for commercial operation using them, has caused the FAA to re-evaluate whether the requirements for certain categories of aircraft (e.g. helicopters, tilt-rotors, small propeller-driven fixed wing) described in part 36 remain appropriate for the noise certification of particular UA designs like the Matternet M2. The FAA has recently begun to consider not only the means of propulsion and flight, but the amount and type of noise generated by UA, which in many cases are small in size, electrically (battery) powered, and may include distributed propulsion features or vertical takeoff and landing capabilities. As a result, it is possible that these aircraft generate less noise than was contemplated when part 36 was promulgated.

A significant consideration is the expected operating environment for UA. Manned airplanes and helicopters normally operate from airports or helipads that include

property that serves as a primary buffer from the general population. The methods of testing and determining proper noise limits used these proximities to the population as their bases, with testing done at large airport test locations and at altitudes representative of takeoff and landing. The UA addressed in this proposal, however, is an aircraft that is intended to operate in closer proximity to people, such as delivering packages in residential areas. These uses are expected to have an impact on persons and property from much closer distances than traditional piloted aircraft.

When tested under the current requirements of part 36 for manned aircraft, the noise generated by many UA could be lost in the ambient background noise at the reference altitude of 492 feet required in part 36 appendix J, while the noise in their proposed operating environments would be more apparent to persons near it.

The use of distributed electric propulsion and a high level of automated control at each rotor allow UA to operate with a variety of profiles, unlike those of larger manned aircraft. The complex vortex field created by the interaction of the rotors, combined with the airframe, can cause such aircraft to exhibit highly tonal spectral content and unique noise directivity patterns that are often coupled with the vehicle flight dynamics and flight profiles. Such noise characteristics and flight profiles have not been considered previously under the standards and testing contained in part 36 and its appendices. These noise characteristics and flight profiles are examples of the factors that caused the FAA to test these aircraft and gather consistent data as a means to understand their relevance and eventual use in informing future standards generally applicable to UA.

Effective generally applicable noise rules require a base of data gathered from a test environment common for all aircraft, and certifications of unmanned aircraft such as this one represent the early stages of such data gathering. At present, the FAA does not have a sufficient database of information about the noise generated by most UA models to establish generally applicable noise standards, due to their novelty and variety. While

small UA have operated under part 107 for several years, those aircraft do not have type or airworthiness certificates, and did not require noise testing; only limited noise data on those smaller models has been collected, and most of the collected data was acquired in a manner inconsistent with formal noise certification test conditions.

As industry seeks both type and airworthiness certification for UA to allow operation under part 91 or commercial operation under part 135, a commensurate shift in the noise certification paradigm is occurring as a means to capture new operational concepts that will be reflected in future regulations. While the FAA will continue to build a database of noise characteristics as it engages with certification applicants, such data gathering takes time and requires input about a number of models and designs before the influences of design on noise can be fully understood. FAA expects to use data collected through this proposed rule to inform future particularly and generally applicable standards.

Matternet applied for type certification of its aircraft on May 18, 2018. The aircraft is a quadcopter design UA with a maximum takeoff weight of 29 pounds including a 4-pound payload, and a proposed operating altitude of 400 feet or lower. Since the FAA has found that the current noise certification standards cannot be effectively applied to the Matternet Model M2 UA, in order to fulfill the statutory requirement under section 44715(a)(3), the FAA is proposing a set of noise certification standards described in this Rule of Particular Applicability that would apply only to the Matternet model M2.

Without this proposed rule, Matternet would be unable to certificate its aircraft until such time as the FAA was able to establish a rule of general applicability for UA noise certification. The benefits of this proposal include establishing a noise certification basis for Matternet to seek type certification, the fulfillment of the FAA's obligation to provide noise standards under 49 USC 44715, and the collection of additional data that

will be used to inform the development of a larger UA noise database from which future standards of general applicability may be developed.

### **III. Discussion of the Proposal**

This proposed rule presents only the noise certification basis for one new model of UA seeking type certification, the Matternet M2. Nothing in this proposed rule is intended to affect the airworthiness certification of this aircraft model or any operational approvals.<sup>1</sup> Those findings are made separately by the FAA in accordance with the applicable aircraft certification and operating rules.

When an applicant presents an aircraft (of any type) for certification, the FAA must determine which among its many regulations apply to the aircraft presented. This is true for airworthiness standards and noise standards. This is an iterative process, during which the FAA determines the standards and processes that apply, taking into account any new or novel features of the aircraft. The FAA works closely with the applicant to ensure that the applicant understands what standards apply, and what must be demonstrated during certification.

As previously discussed, in the case of the Matternet model M2 UA, the FAA reviewed part 36, including its appendices, and determined that while the subject aircraft has some characteristics that are similar to a small helicopter that would be noise certificated under appendix J, the differences require noise certification test criteria and standards tailored to the size and features of the UA. The FAA then worked with Matternet to understand the novel features and expected operating environment of the aircraft so that the FAA could determine the appropriate modifications and additions to the limits and procedures to develop a complete noise certification basis that would effectively profile the aircraft. The results of the agency's assessments are presented in

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<sup>1</sup> In addition, this rule neither assesses the environmental impacts of any eventual operation of the subject aircraft, nor constitutes any environmental review that may be required by the FAA before granting operational approval. Any such environmental review would be completed in advance of granting operational approval(s).

this proposed rule. The proposed rule text is annotated at the beginning of each paragraph to indicate similar requirements in appendix J for those unfamiliar with noise certification requirements. The requirements presented in this proposal stand alone for certification of the M2 aircraft.

In addition to the data gathered for noise certification of the model M2, the applicant has agreed to conduct another test and give the resulting data to the FAA to inform the larger database of noise experience with UA. Data from the supplemental test are not part of the type or airworthiness certification basis of the aircraft and will not be evaluated against any noise limits or regulatory criteria for noise certification purposes.

The supplemental test is designed to gather further information on an aircraft that is capable of hovering. The FAA developed the supplemental testing procedure with a consideration toward minimal test efforts; for example, no new or extra equipment is required. Additionally, rather than placing microphones at different spatial locations, the microphone is placed at height 4 feet above the ground in accordance with paragraph (22) of this proposed rule and remains in place.

#### Differences from Generally Applicable Noise Regulations

As stated above, the FAA began its determination of the noise certification basis for the Matternet M2 aircraft using the outline of standards and procedures for small helicopters. To compensate for the novel aircraft design features, including the size, propulsion system, and proposed flight operations, the FAA proposes the following new standards for inclusion in the M2 noise certification basis:

1. The reference altitude for the level flyover test is 250 feet (rather than 492 feet in appendix J), item 6 in the proposed standard. This lower reference altitude addresses the nominal altitude for this UA, and was determined to be representative of the lowest cruise altitude for this UA based on operational data provided by the applicant. A major consideration in choosing reference altitude

was the ability to collect sufficient noise signals that exceeded the background (ambient) noise at a typical test site (maintaining an acceptable signal-to-noise ratio). As tests are conducted, an applicant may be directed by the FAA to fly the aircraft at an altitude lower than the reference height to achieve a signal-to-noise ratio that meets the certification test requirements. If that occurs, the noise data collected at the actual test altitude would be mathematically adjusted to the reference altitude after the testing is complete. All such adjustments would be included in the test report.

2. The reference airspeeds for flyover testing are: (a) maximum flight speed at empty weight; and (b) highest cruise speed at maximum takeoff weight, (rather than a single reference speed as is used for small helicopters), paragraph (6)(c) in the proposed rule. Although both speed and aircraft weight contribute to noise generation, the FAA does not have sufficient data regarding these two factors to know which dominates in UA designs such as the Matternet model M2. The proposed rule requires the aircraft to be tested at two sets of reference conditions to address the potential noise conditions over a range of operations determined to be representative of the aircraft operation.
3. The sound exposure level limit is 78 dB at the prescribed new reference level flyover altitude of 250 feet. Two considerations resulted in this new limit. The first consideration accounts for the lower reference altitude, which, without a consideration for weight, would increase the noise to 85.7 dB, or 3.7 dB higher than 82 dB in appendix J for a small helicopter weighting less than 3215 lbs. and flying at reference altitude of 492 ft. The second consideration is for aircraft weight. The curve that flattens out at 82 dB in appendix J applies to small manned helicopters weighing between 0 and 3125 lbs.; this curve was simplified to include the possibility of manned ultralight helicopters of unknown weight. In



evaluating the Matternet M2 noise, the noise curve section reduced at a constant, resulting in the limit proposed here, which is 7.7 dB lower. The two adjustments together yields the new noise limit of 78 dB ( $78 = 82 + 3.7 - 7.7$ ).

This proposed rule also contains updated terminology, equipment references, recording standards, and relevant best practices that have become standard in the industry since appendix J was first adopted in 1992 and are used in current noise certification. As an example, the FAA included more detailed requirements for the area immediately surrounding a test microphone regarding the condition of the ground surface, which is expected to be more sensitive to smaller aircraft with a single microphone arrangement. Such additions were sourced from FAA guidance materials and agency orders.

This proposed rule also includes the requirement to create and get approval for a test plan, which is used during certification testing but may be unfamiliar to newer certification applicants. An applicant seeking noise type certification must prepare a test plan when testing is required to demonstrate compliance to the regulations. The applicant should submit the test plan early enough to allow the FAA time to review and approve the test plan before the planned start of testing. A test plan typically contains descriptions of the aircraft, equipment, calibration procedures, and test procedures.

The FAA seeks specific input from interested persons concerning the considerations the agency used to select the proposed reference test height of 250 feet AGL for flyover noise testing of UAS, as discussed here. Commenters are encouraged to submit any data that supports the use of different considerations that would be appropriate for aircraft of this type.

#### **IV. Regulatory Notices and Analyses**

##### **A. Executive Order 12866, Regulatory Planning and Review**

This proposed rule of particular applicability is not subject to review under Executive Order 12866, Regulatory Planning and Review, as that Executive Order applies only to rules of general applicability.

#### B. Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980 (Public Law 96-354) (RFA) establishes “as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation.” To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration. The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA. However, if an agency determines that a proposed rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the RFA provides that the head of the agency may so certify, and a regulatory flexibility analysis is not required.

This proposed rule only impacts Matternet, which is considered a small business based on the U.S. Small Business Administration (SBA) size standards. The SBA lists small business size standards based on the North American Industry Classification System (NAICS). NAICS code 336411 is titled “Miscellaneous Aircraft Manufacturing,” and includes the manufacture of unmanned and robotic aircraft. The SBA defines industries within this code to be small if they employ 1,500 employees or less.

The FAA expects this proposed rule of particular applicability would have small costs for Matternet to conduct tests and gather data. These would be one-time test costs representing a very small cost relative to the overall costs of seeking of type certification. This proposed rule would benefit Matternet by enabling a noise certification basis for it to complete the type certification it seeks. The FAA expects this proposed rule would not have a significant economic impact on Matternet.

If an agency determines that a rulemaking will not result in a significant economic impact on a substantial number of small entities, the head of the agency may so certify under section 605(b) of the RFA. Therefore, based on the foregoing discussion, as provided in section 605(b), the head of the FAA certifies that this rulemaking will not result in a significant economic impact on a substantial number of small entities. The FAA requests comments on this certification.

#### C. International Trade Impact

The Trade Agreements Act of 1979 (Public Law 96-39), as amended by the Uruguay Round Agreements Act (Public Law 103-465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standard has a legitimate domestic objective, such as the protection of safety, and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. The FAA has determined this proposed rule would not present any obstacle to foreign commerce of the United States. In addition, this proposed rule is not contrary to international standards since no international standards for UA noise certification exist.

#### D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (Public Law 104-4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of \$100 million or more (in 1995 dollars) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a “significant regulatory action.” The FAA currently uses an inflation-adjusted value of \$155 million in lieu of \$100 million. This proposed rule does not contain such a mandate; therefore, the requirements of Title II of the Act do not apply.

#### E. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. The FAA has determined that this proposed rule does not impose any new requirement for information collection covered by the Act.

#### F. International Compatibility

The FAA remains actively involved in the International Civil Aviation Organization’s (ICAO) Committee on Aviation Environmental Protection (CAEP) and CAEP’s Working Group 1 that addresses aircraft noise. Working Group 1 began activities to address noise from UA in 2013. There are at present no noise or other environmental standards for UA that have been adopted into ICAO Annex 16. The FAA has determined that there are no ICAO Standards and Recommended Practices that correspond to these proposed regulations so as to require conformance.

While the FAA has begun type and noise certification of UA, the European Union Aviation Safety Agency (EASA) has focused on operational regulations. In March 2020, EASA published its Easy Access Rules for Unmanned Aircraft (Regulation 2019/947 and delegated regulation 2019/945), which contain the applicable rules and procedures for the operation of unmanned aircraft in the EU. While the regulations contain some

requirements for noise measurement depending on the operating environment of the UA, they are limited to operations in the EU and are not a certification standard as is proposed here.

#### G. Environmental Analysis

FAA Order 1050.1F identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 5-6.6 (d) (Categorical Exclusions for Regulatory Actions) since it is a rulemaking action that proposes a certification test standard, and would not presume the acceptability of operation of any particular aircraft in any location. No extraordinary circumstances are involved.

### **V. Executive Order Determinations**

#### A. Executive Order 13132, Federalism

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. The agency has determined that this action would not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, would not have Federalism implications.

#### B. Executive Order 13211, Regulations that Significantly Affect Energy Supply, Distribution, or Use

The FAA analyzed this proposed rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The agency has determined that it would not be a “significant energy action” under the executive order and would not be likely to have a significant adverse effect on the supply, distribution, or use of energy.

## **VI. Additional Information**

### **A. Comments Invited**

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. The agency also invites comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. To ensure the docket does not contain duplicate comments, commenters should send only one copy of written comments, or if comments are filed electronically, commenters should submit only one time.

The FAA will file in the docket all comments it receives, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. Before acting on this proposal, the FAA will consider all comments it receives on or before the closing date for comments. The FAA will consider comments filed after the comment period has closed if it is possible to do so without incurring expense or delay. The agency may change this proposal in light of the comments it receives.

**Confidential Business Information:** Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this NPRM contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this NPRM, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public

docket of this NPRM. Submissions containing CBI should be sent to Hua (Bill) He, Federal Aviation Administration, Office of Environment and Energy, 800 Independence Ave. SW., Room 900 West, Washington, D.C. 20591; telephone (202) 267-3565; e-mail hua.he@faa.gov. Any commentary that the FAA receives which is not specifically designated as CBI will be placed in the public docket for this rulemaking.

#### B. Availability of Rulemaking Documents

An electronic copy of rulemaking documents may be obtained from the Internet by—

1. Searching the Federal eRulemaking Portal ([www.regulations.gov](http://www.regulations.gov));
2. Visiting the FAA's Regulations and Policies web page at [www.faa.gov/regulations\\_policies](http://www.faa.gov/regulations_policies) or
3. Accessing the Government Printing Office's web page at [www.GovInfo.gov](http://www.GovInfo.gov).

Copies may also be obtained by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW, Washington, DC 20591, or by calling (202) 267-9680. Commenters must identify the docket or notice number of this rulemaking.

All documents the FAA considered in developing this proposed rule, including economic analyses and technical reports, may be accessed from the Internet through the Federal eRulemaking Portal referenced in item (1) above.

#### **The Proposed Noise Certification Basis**

In consideration of the foregoing, and under the authority of Title 49 of the United States Code, section 44715(a), the Federal Aviation Administration proposes that the following standards and procedures apply as the noise certification basis of the Matternet M2 model aircraft.

All statutory references in this Rule of Particular Applicability (rule) refer to Title 49 of the United States Code. All regulatory references refer to Title 14 of the Code of Federal Regulations, part 21 or part 36 and its appendices, unless otherwise cited.

**Noise Certification Requirements for the Matternet M2 Model Aircraft:**

(1) **General:** The requirements and limitations of 14 CFR 36.3 and 36.6 apply to the Matternet M2 model aircraft, except as described herein.

(a) **Limitations** (Reference § 36.5, as modified): Pursuant to 49 U.S.C.

44715(b)(4), the noise level in this Rule of Particular Applicability (rule) has been determined to be as low as is economically reasonable, technologically practicable, and appropriate for this aircraft. No determination is made that these noise levels are or should be acceptable or unacceptable for operation at, into, or out of, any airport, landing or launch pad, community, or any other environment that may be impacted or is sensitive to noise.

(b) **Acoustical Change** (Reference § 36.9 as modified): If, after type certification using the requirements stated herein, the aircraft incorporates a change in type design, the changed design is subject to an acoustical change analysis and approval in accordance with § 21.93(b). After such change in design, the aircraft may not subsequently exceed the noise limits specified in this rule.

(2) **Noise Measurement** (Reference § 36.801, as modified): The noise generated by the aircraft must be measured at the noise measuring point and under the test conditions prescribed in paragraphs (7) through (23) of this rule, or using an equivalent procedure approved by the FAA before testing. Any procedure not approved by the FAA before a test is performed is subject to disapproval and may require the aircraft to be retested using an approved procedure.



- (3) **Noise Evaluation** (Reference § 36.803, as modified): The noise measurement data required by paragraph (2) of this rule must be obtained using the test procedures in paragraphs (7) through (23) of this rule, and:
- (a) Corrected to the reference conditions contained in paragraphs (5) and (6) of this rule; and
  - (b) Evaluated using the procedures in paragraphs (24) through (26) of this rule, or using an FAA-approved equivalent procedure. Any procedure not approved by the FAA before a test is performed is subject to disapproval and may require the aircraft to be retested using an approved procedure.
- (4) **Noise Limits** (Reference § 36.805, as modified): Compliance with the noise limits prescribed in paragraphs (28) and (29) of this rule must be shown for this aircraft for which application for issuance of a type certificate in the special class is made under part 21.
- (5) **Reference Conditions - General** (Reference part 36 appendix J, section J36.1, as modified): Paragraphs (6) through (29) of this rule prescribe the noise certification requirements for this aircraft including:
- (a) The conditions under which each noise certification test must be conducted and the measurement procedure that must be used to measure the aircraft noise during the test;
  - (b) The procedures that must be used to correct the measured data to the reference conditions, and to calculate the noise evaluation quantity designated as the A-weighted Sound Exposure Level (SEL, denoted by symbol  $L_{AE}$ ); and
  - (c) The noise limit with which compliance must be shown.
- (6) **Reference Conditions – Test** (Reference part 36 appendix J, section J36.3, as modified):

(a) Meteorological Conditions - The following are the noise certification reference atmospheric conditions that are assumed to exist from the surface to the aircraft altitude:

- i. Sea level pressure of 2,116 pounds per square foot (76 centimeters of mercury);
- ii. Ambient temperature of 77 degrees Fahrenheit (25 degrees Celsius);
- iii. Relative humidity of 70 percent; and
- iv. Zero wind.

(b) Reference test site. The reference test site is flat and without line-of-sight obstructions, including any area across the flight path that is long enough to encompass the 10 dB down points of the A-weighted time history.

(c) Level flyover reference profile. For UA, the reference flyover profile is a level flight, 250 feet (76.2 meters) above ground level as measured at the noise measuring station. The reference flyover profile has a linear flight track and passes directly over the noise monitoring station. The applicable reference airspeed is stabilized and maintained throughout the measured portion of the flyover. Rotor speed is normal operating RPM throughout the 10 dB-down time interval. For UA, applicable reference airspeeds are:

- i.  $V_{\max} \sim 0.9V_{NE}$ , where  $V_{NE}$  is the never-exceed airspeed (at empty weight).
- ii.  $V_{\text{cruise}} \sim V_H$ , where  $V_H$  is the maximum performance airspeed (at maximum certificated takeoff weight (MTOW)),

(d) Two series of flyover tests are required. Each series must be flown at the weight and applicable reference speed conditions as follows:

- i. MTOW (inclusive of payload) and  $V_{\text{cruise}}$ ; and
- ii. Empty weight (no payload) and  $V_{\max}$ .

- (7) **Noise Measurement Procedures -- General** (Reference part 36, appendix J, section J36.101(a) as modified): Paragraphs (8) through (10) of this rule prescribe the conditions under which the aircraft noise certification tests must be conducted, and the measurement procedures that must be used to measure the aircraft noise during each test.
- (8) **Test site requirements** (Reference: part 36, appendix J, section J36.101(b), as modified):
- (a) The noise measuring station must be surrounded by terrain having no excessive sound absorption characteristics, such as might be caused by thick, matted, or tall grass, shrubs, wooded areas, or loose soil. Grass is acceptable if mowed to 3 inches or less in a 25 foot radius around any sound measuring stations.
  - (b) During the period when the flyover noise measurement is within 10 dB of the maximum A-weighted sound level, no obstruction that significantly influences the sound field from the aircraft may exist within a conical space above the noise measuring position (the point on the ground vertically below the microphone). The cone is defined by an axis normal to the ground and by half-angle 80 degrees from this axis.
- (9) **Weather restrictions** (Reference: part 36, appendix J, section J36.101(c) as modified): Each test must be conducted under the following atmospheric conditions:
- (a) No rain or other precipitation.
  - (b) Ambient air temperature between 36 degrees and 95 degrees Fahrenheit (2 degrees and 35 degrees Celsius), inclusively, and relative humidity between 20 percent and 95 percent inclusively, except that testing may not take place where combinations of temperature and relative humidity result in a rate of

atmospheric attenuation greater than 10 dB per 100 meters (30.5 dB per 1000 feet) in the one-third octave band centered at 8 kiloHertz.

- (c) Wind velocity that does not exceed 10 knots (19 km/h) and a crosswind component that does not exceed 5 knots (9 km/h). The wind must be determined using a continuous averaging process of no greater than 30 seconds.
- (d) Measurements of ambient temperature, relative humidity, wind speed, and wind direction must be made between 4 feet (1.2 meters) and 33 feet (10 meters) above the ground. Unless otherwise approved by the FAA, ambient temperature and relative humidity must be measured at the same height above the ground.
- (e) No anomalous wind conditions (including turbulence) or other anomalous meteorological conditions that could significantly affect the noise level of the aircraft when the noise is recorded at the noise measuring station.
- (f) If the measurement site is within 6,560 feet (2,000 meters) of a fixed meteorological station (such as those found at airports or other facilities), the weather measurements reported at that station may be used for temperature, relative humidity and wind velocity, when approved by the FAA before the test is conducted. The use of measurements reported at a fixed meteorological station, if not approved by the FAA before a test is performed, may cause the test to be disapproved and require that the aircraft be retested.

**(10) Aircraft test procedures** (Reference part 36, appendix J, section J36.101(d), as modified):

- (a) The aircraft test procedures and noise measurements must be conducted and processed in a manner that yields the noise evaluation measure designated  $L_{AE}$ , as defined in paragraph (17) of this rule.
- (b) The aircraft height relative to the noise measurement point sufficient to make corrections required in paragraph (26) of this rule must be determined by an

FAA-approved method that is independent of normal flight instrumentation, such as a Differential Global Positioning System (DGPS), or photographic scaling techniques. The aircraft position in three dimensions relative to the microphone must be monitored and recorded at all times during the test and data collection, with correlation via time synchronization to the acoustic noise data collection. The accuracy of the aircraft location system, and all sources of inaccuracy, along with possible error introduction when correlating to measured and recorded noise (inaccuracies of timing devices and methods), must be determined and reported. A description of the aircraft location system and its accuracy must be included as part of the noise test plan required by paragraph (31) of this rule, and approved by the FAA before use.

- (c) If an applicant demonstrates that the design characteristics of the aircraft would prevent flight from being conducted in accordance with the reference test conditions prescribed in paragraph (6) of this rule, then the applicant may request a variance in reference test conditions to be used. Any variance from standard reference test conditions is limited to that required for the subject aircraft design characteristics that make compliance with the reference test conditions impossible.

**(11) Flyover Test Conditions** (Reference part 36, appendix J, section J36.105(a), as modified): Paragraphs (12) through (15) of this rule prescribe the flight test conditions and allowable random deviations for flyover noise tests conducted to demonstrate compliance with this rule.

**(12) Level flight height and lateral path tolerances** (Reference part 36, appendix J, section J36.105(b), as modified): A test series must consist of at least six flights. The number of level flights made with a headwind component must be equal to the

number of level flights made with a tailwind component over the noise measurement station:

- (a) In level flight and in cruise configuration;
- (b) At the test height above the ground level over the noise measuring station as defined in paragraph (6) of this rule. For the selected height, the vertical tolerance of this height should be  $\pm 10\%$  value; and
- (c) Within  $\pm 10$  degrees from the zenith.

**(13) Airspeed and Controls** (Reference part 36, appendix J, section J36.105(c), as modified): Each flyover noise test flight must be conducted:

- (a) At the reference airspeed specified in paragraph (6)(c) of this rule; and
- (b) With the flight controls stabilized during the period when the measured aircraft noise level is within 10 dB of the maximum A-weighted sound level ( $L_{Amax}$ ).

**(14) Aircraft weight** (Reference part 36, appendix J, section J36.105(d), as modified):

For the weight at which noise certification is requested, the aircraft test weight for each flyover test series must be specified for:

- (a) MTOW (inclusive of payload); and
- (b) Empty weight (no payload).

**(15) Flyover height adjustment** (Reference part 36, appendix J, section J36.105(e), as

modified): If ambient noise at the measurement station, measured in accordance with paragraphs (17) through (21) of this rule, is found to be within 15 A-weighted decibels (dB(A)) of the A-weighted aircraft noise level ( $L_{Amax}$ ), measured at the same location, the applicant may request the FAA approve an alternate flyover height. If an alternate flyover height is approved, the results must be adjusted to the reference flyover height specified in paragraph (6)(c) of this rule using an FAA-approved method.

**(16) Supplemental hover test conditions** –This is a supplemental test to collect data for assessment of community noise impacts, and to inform later general noise and test standards for UA. This supplemental test does not require compliance with a noise limit and does not affect the noise certification findings for the subject aircraft.

The aircraft is required to hover at different spatial locations relative to the microphone in accordance with subparagraphs (a) through (f) of this paragraph.

(a) The aircraft must be at MTOW, inclusive of maximum payload weight of cargo.

(b) To ensure that the widest dimensional profile of the noise source is captured in the recordings, for each aircraft attitude heading (0, 90, 180 and 270 degrees) relative to the microphone position for hover conditions described in paragraphs (16)(c) and (d) of this rule, stabilize the aircraft in hover and record the sound in accordance with paragraph (16)(f) of this rule.

(c) Hover condition #1 (sound elevation angle at zero degrees): The aircraft maintains a hover condition at a lateral distance of 20 feet to the microphone and at 4 feet AGL (rotors in the same plane as the microphone). Test when the conditions are optimal for minimal influence of wind on the noise recording.

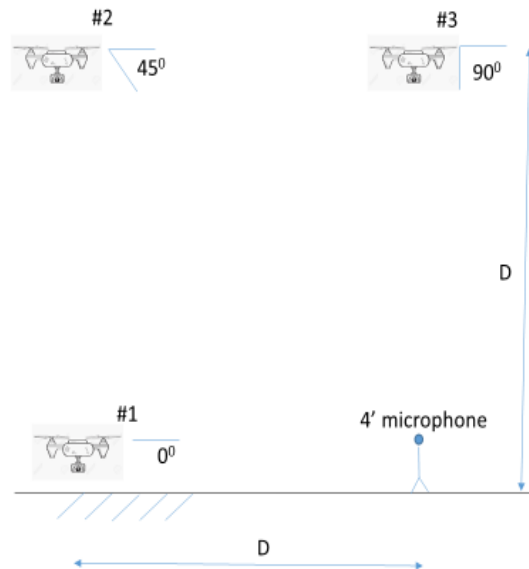
(d) Hover condition #2 (sound elevation angle at 45 degrees): The aircraft maintains a hover condition at a lateral distance of 20 feet to the microphone position and at 20 feet AGL. Test when the conditions are optimal for minimal influence of wind on the noise recording.

(e) Hover condition #3 (overhead, or sound elevation angle at 90 degrees): The aircraft maintains a hover condition at 20 feet AGL and hold centered within a one foot radial over the microphone location.

(f) For the noise measurements at each hover condition, record the value of the equivalent sound level (Leq) and SPL in 1/3 octave bands for a minimum of 30

seconds for each of the test conditions (paragraphs 16(c) through (e) of this rule).

- (g) The tolerance of the hover height or lateral distance is within  $\pm 1$  ft., and the tolerance of the headings is within  $\pm 5$  degrees.



Sketch of supplemental hover test conditions.  $D = 20$  feet.

- (17) Measurement of aircraft noise received on the ground – General** (Reference: part 36, appendix J, section J36.109(a), as modified): Aircraft noise measurements made for the purpose of noise certification in accordance with the requirements of this regulation must be obtained using:
- (a) The noise evaluation metric prescribed in paragraph (18) of this rule;
  - (b) Acoustic equipment that meets the specifications prescribed in paragraphs (19) and (20) of this rule; and
  - (c) The calibration and measurement procedures prescribed in paragraphs (21) and (22) of this rule.
- (18) Measurement of aircraft noise received on the ground – Noise unit definition** (Reference part 36, appendix J, section J36.109(b), as modified):



(a) The sound exposure level, as expressed in  $L_{AE}$ , is defined as the level, in decibels, of the time integral of squared ‘A’-weighted sound pressure ( $P_A$ ) over a given time period or event, with reference to the square of the standard reference sound pressure ( $P_0$ ) of 20 micropascals and a reference duration of one second.

(b) The sound exposure level in units of decibels (dB) is defined by the expression:

$$L_{AE} = 10 \log_{10} \frac{1}{T_0} \int_{t_1}^{t_2} \left( \frac{P_A(t)}{P_0} \right)^2 dt \text{ (dB)}$$

Where  $T_0$  is the reference integration time of one second and  $(t_2-t_1)$  is the integration time interval.

(c) The integral equation of paragraph (18)(b) can also be expressed as:

$$L_{AE} = 10 \log_{10} \frac{1}{T_0} \int_{t_1}^{t_2} 10^{0.1L_A(t)} dt \text{ (dB)}$$

Where  $L_A(t)$  is the time varying A-weighted sound level.

(d) The integration time  $(t_2-t_1)$  in practice must not be less than the time interval during which  $L_A(t)$  first rises to within 10 dB(A) of its maximum value ( $L_{Amax}$ ) and last falls below 10 dB(A) of its maximum value.

## **(19) Measurement of Aircraft Noise Received on the Ground – Measurement**

**System** (Reference part 36, appendix J, section J36.109(c), as modified):

- (a) Acoustical measurement system instrumentation must be equivalent to the following and approved by the FAA:
- i. A microphone system with frequency response that is compatible with the measurement and analysis system accuracy prescribed in paragraph (20) of this rule;
  - ii. Tripods or similar microphone mountings that minimize interference with the sound energy being measured; and

- iii. Recording and reproducing equipment with characteristics, frequency response, and dynamic range that are compatible with the response and accuracy requirements of paragraph (20) of this rule.
- (b) The calibration and checking of measurement systems must be accomplished in accordance with the procedures described in part 36, appendix A, section A36.3.9.

**(20) Measurement of Aircraft Noise Received on the Ground – Sensing, recording, and reproducing equipment** (Reference part 36, appendix J, section J36.109(d), as modified):

- (a) The sound pressure time-history (audio) signals obtained from aircraft flyovers under this paragraph must be recorded digitally at a minimum sample rate of 44 kilohertz (kHz) for a minimum bandwidth of 20 hertz (Hz) to 20 kHz, and encoded using a minimum of 16 bit linear PCM (or equivalent) during analog to digital conversion. Digital audio recording must also meet the additional requirements specified in part 36, appendix A, section A36.3.6 “Recording and Reproducing Systems.”
- (b) The  $L_{AE}$  value from each flyover and A-weighted  $L_{eq}$  ( $L_{Aeq}$ ) values from each hover test flight condition may be determined directly from an integrating sound level meter that meets the specifications of International Electrotechnical Commission (IEC) Standard 61672-1 (2013) for a Class 1 instrument set at “slow” response.
- (c) The acoustic signal from the aircraft, along with the calibration signals specified in paragraph (21) and the background noise signal required by paragraph (22) of this rule, must be recorded in a digital audio format as specified in paragraph (20)(a) of this rule for subsequent analysis for an integrating sound level meter identified in paragraph (20)(b) of this rule. The record/playback system must

conform to the requirements prescribed in part 36, appendix A, section A36.3.6 “Recording and Reproducing Systems”. The recorder must comply with the specifications of IEC standard 61265 2nd edition (2018).

- (d) The characteristics of the complete system must meet the specifications of IEC standard 61672-1 for the microphone, amplifier, and indicating instrument characteristics.
- (e) The response of the complete system to a plane, progressive wave of constant amplitude must lie within the tolerance limits specified for Class 1 instruments in IEC standard 61672-1 for weighting curve “A” over the frequency range of 45 Hz to 20 kHz.
- (f) A windscreen must be used with the microphone during each measurement of the aircraft flyover noise. Correction for any insertion loss produced by the windscreen, as a function of the frequency of the acoustic calibration required by paragraph (21) of this rule, must be applied to the measured data, and each correction applied must be included in the test report.

**(21) Measurement of Aircraft Noise Received on the Ground – Calibrations**

(Reference part 36, appendix J, section J36.109(e), as modified):

- (a) For the aircraft acoustic signal recorded for subsequent analysis, the measuring system and components of the recording system must be calibrated as prescribed in Title 14 CFR, part 36, appendix A.
- (b) If the aircraft acoustic signal is measured directly using an integrating sound level meter:
  - i. The overall sensitivity of the measuring system must be checked before and after the series of flyover tests and at intervals (not exceeding a two-hour duration) during the flyover tests using an acoustic calibrator

generating a sinusoidal signal at a known sound pressure level and at a known frequency.

- ii. The performance of equipment in the system is considered satisfactory if, during each day's testing, the variation in the measured value for the acoustic calibrator does not exceed 0.5 dB. The  $L_{AE}$  data collected during the flyover tests must be adjusted to account for any variation in the calibration value.
- iii. A performance calibration analysis of each piece of calibration equipment, including acoustic calibrators, reference microphones, and voltage insertion devices, must have been made during the six calendar months preceding the beginning of the aircraft flyover series. Each calibration must be traceable to the National Institute of Standards and Technology.

**(22) Measurement of Aircraft Noise Received on the Ground – Noise measurement procedures** (Reference part 36, appendix J, section J36.109(f), as modified):

- (a) The microphone must be of a pressure-sensitive capacitive type designed for nearly uniform grazing incidence response. The microphone must be mounted with the center of the sensing element 4 feet (1.2 meters) above the local ground surface and must be oriented for grazing incidence such that the sensing element (diaphragm) is substantially in the plane defined by the nominal flight path of the aircraft and the noise measurement station. A microphone that satisfies the requirements of this paragraph must be used when determining compliance with the noise limit prescribed in paragraph (29) of this rule.
- (b) For each aircraft acoustic signal recorded for subsequent analysis, the frequency response of the electrical system must be determined at a level within 10 dB of the full-scale reading used during the test.

- (c) The background noise, including both ambient acoustical sound present at the microphone site and electrical noise of the measurement systems, must be determined in the test area and the system gain set at levels which will be used for aircraft noise measurements. If aircraft sound levels do not exceed the background sound levels by at least 15 dB(A), flyovers at an FAA-approved lower height may be used; the results must be adjusted to the reference measurement point by an FAA-approved method.
- (d) When an integrating sound level meter is used to measure the aircraft noise, the instrument operator must monitor the continuous A-weighted (slow response) noise levels throughout each flyover to ensure that the A-weighted sound exposure level ( $L_{AE}$ ) integration process includes, at minimum, all of the noise signal between the  $L_{Amax}$  and the 10 dB down points in the flyover time history. The instrument operator must note the actual dB(A) levels at the start and stop of the  $L_{AE}$  integration interval and document these levels along with the value of  $L_{Amax}$  and the integration interval (in seconds) for inclusion in the noise data submitted as part of the reporting requirements in paragraph (23) of this regulation.

**(23) Data Reporting – General** (Reference part 36, appendix J, section J36.111(a), as modified): Data representing physical measurements, and corrections to that measured data, including corrections to measurements for equipment response deviations, must be recorded in permanent form and appended to the test reports required by this rule. Each correction is subject to FAA approval.

**(24) Data Submission** (Reference part 36, appendix J, section J36.111(b), as modified): After the completion of all certification tests required by this rule, the following must be submitted to the FAA:

- (a) A test report containing the following:

- (i) Measured and corrected sound levels obtained with equipment conforming to the standards prescribed in paragraphs (17) through (22) of this rule;
- (ii) A description of the equipment and systems used for measurement and analysis of all acoustic, aircraft performance and flight path, and meteorological data;
- (iii) The atmospheric environmental data required to demonstrate compliance with this rule, as measured throughout the test period;
- (iv) Conditions of local topography, nearby ground cover (if any), or events that may have interfered with a sound recording;
- (v) The following aircraft information:
  - A) Type, model, and serial numbers, if any, of aircraft, engine(s) and rotor(s) and/or propellers tested;
  - B) Gross dimensions of aircraft, location of engines or motors, rotors or propellers, number of blades for each rotor or propeller, and the range of rotational speeds of the rotors;
  - C) MTOW at which certification under this rule is requested;
  - D) Aircraft configuration, including landing gear positions;
  - E) Aircraft Airspeeds:  $V_{NE}$  and  $V_{max}$  for both empty weight and maximum payload configuration, or for maximum range, whichever is greatest, and applicable as reference and operational airspeeds;
  - F) Aircraft gross weight for each test run;
  - G) Indicated and true airspeed for each test run; if indicated and true airspeed for each run are not available, then ground speed as measured from a DGPS, or from an alternate method, may be approved by the FAA;
  - H) Ground speed, if measured, for each run;

- I) Aircraft engine performance as determined from aircraft instruments and manufacturer's data; and
  - J) Aircraft flight path above ground level, referenced to the microphone position of the noise measurement station, in feet, determined using an FAA-approved method that is independent of normal flight instrumentation, such as DGPS or photo scaling techniques at the microphone location;
- (vi) Aircraft position and performance data necessary to make the adjustments prescribed in paragraph (27) of this rule and to demonstrate compliance with the performance and position restrictions prescribed in paragraphs (11) through (16) of this rule; and
  - (vii) The aircraft position in three dimensions and orientation (for hover) relative to the microphone must be monitored and recorded at all times during the test and data collection, with correlation via time synchronization to the acoustic noise data collection.
- (b) All of the recorded audio data from all phases of all flight tests used to demonstrate compliance with this rule.
  - (c) All recordings and data collected during the measurement activity required by paragraph (16) of this rule. These data will not affect the outcome of this certification findings intended to demonstrate compliance with this rule and may be submitted separately from data that affects certification.

**(25) Noise Evaluation and Calculations – Noise Evaluation Expressed in  $L_{AE}$**

(Reference: part 36, appendix J, section J36.201, as modified): The noise evaluation measure must be expressed as the  $L_{AE}$  in units of dB(A) as prescribed in paragraph (18) of this rule. The  $L_{AE}$  value for each flyover may be determined directly using an integrating sound level meter. Specifications for the integrating sound level

meter and requirements governing the use of such instrumentation are prescribed in paragraphs (17) through (22) of this rule.

**(26) Noise Evaluation and Calculations – Calculation of Noise Levels** (Reference part 36, appendix J, section J36.203, as modified):

- (a) To demonstrate compliance with the noise level limits specified in paragraph (29) of this rule, the  $L_{AE}$  noise levels from each valid flyover, corrected as necessary to reference conditions in accordance with paragraph (27) of this rule, must be arithmetically averaged to obtain a single  $L_{AE}$  dB(A) mean value for each flyover series. No individual flyover run may be omitted from the averaging process, unless approved by the FAA.
- (b) The minimum sample size acceptable for the aircraft flyover certification measurements is six. The number of samples must be sufficient to establish statistically a 90 percent confidence limit that does not exceed  $\pm 1.5$  dB(A).
- (c) All data used and calculations performed under this paragraph, including the calculated 90 percent confidence limits, must be documented and provided in accordance with the data reporting and submission requirements of paragraphs (23) and (24) of this rule.

**(27) Data Correction Procedures** (Reference part 36, appendix J, section J36.205, as modified):

- (a) When certification test conditions measured in accordance with paragraphs (7) through (23) of this rule differ from the reference test conditions prescribed in paragraph (6) of this rule, appropriate adjustments must be made to the measured noise data in accordance with the methods set out in paragraphs (27)(b) and (c) of this rule. At minimum, appropriate adjustments in accordance with paragraph (27)(b) of this rule must be made for off-reference altitude and



for any difference between reference airspeed and adjusted reference airspeed in accordance with paragraph (27)(c) of this rule.

- (b) The adjustment for off-reference altitude may be approximated from:

$$< \delta > J1 = 12.5 \log_{10}(H_T/250) \text{ (dB)}$$

Where  $< \delta > J1$  is the quantity in decibels that must be algebraically added to the measured  $L_{AE}$  noise level to correct for an off-reference flight path,  $H_T$  is the height, in feet, of the test aircraft when directly over the noise measurement point, and the constant (12.5) accounts for the effects on spherical spreading and duration from the off-reference altitude.

- (c) The adjustment for the difference between reference airspeed and adjusted reference airspeed is calculated from:

$$< \delta > J3 = 10 \log_{10}(V_{RA}/V_R) \text{ (dB)};$$

Where  $< \delta > J3$  is the quantity in decibels that must be algebraically added to the measured  $L_{AE}$  noise level to correct for the influence of airspeed on the integration duration of the measured flyover event as received at the noise measurement station;  $V_R$  is the reference airspeed as prescribed in paragraph (6)(c) of this rule, and  $V_{RA}$  is a speed adjustment applied to the reference airspeed to allow flying at an airspeed that provides the reference tip Mach speed. The reference airspeed must be adjusted for the atmospheric conditions on site.

- (d) All data used and calculations performed under this paragraph must be documented and submitted in accordance with paragraphs (22) and (23).

**(28) Noise Limit Compliance - Noise Measurement, Evaluation, and Calculation**

(Reference part 36, appendix J, section J36.301, as modified): In demonstrating

compliance with this rule, the aircraft noise levels must be measured, evaluated, and calculated in accordance with paragraphs (7) through (26) of this rule.

**(29) Noise Limit** (Reference part 36, appendix J, section J36.305, as modified): The calculated noise levels of the aircraft, at the measuring point described in paragraphs (7) through (10) of this rule, must be shown to not exceed 78.0 decibels  $L_{AE}$  at the reference altitude of 250 feet.

**(30) Manuals, Markings, and Placards** (Reference part 36 §§36.1501 and 36.1581, as modified):

- (a) All procedures, weights, configurations, and information or data used to obtain the certified noise levels required to demonstrate compliance with this rule, including equivalent procedures used for flight, testing, and analysis, must be approved by the FAA.
- (b) Noise levels achieved during type certification must be included in the approved portion of each Unmanned Aircraft Flight Manual for the subject aircraft. If an Unmanned Aircraft Flight Manual is not approved, the procedures and information must be furnished in a combination of manual material, markings, and placards approved by the FAA. The noise level information that must be included is as follows:
  - i. The noise level information must be one value for flyover as defined and required by these specifications; the value is determined at the maximum reference speed, weight and configuration in accordance with paragraph (6)(c) of this rule. The noise level value must also indicate the series from which it was determined.
  - ii. If supplemental operational noise level information is included in the approved portion of the Unmanned Aircraft Flight Manual, it must be segregated, identified as information that is provided in addition to the

certificated noise levels, and clearly distinguished from the information required by paragraph (30)(b)(i) of this rule.

- iii. The following statement must be included in each approved manual near the listed noise level:

No determination has been made by the Federal Aviation Administration that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of any location or environment that may be affected by operational noise.

- (31) Test Plan Preparation and Approval:** Prior to conducting any testing and data collection required by this rule, the applicant must prepare a test plan and obtain approval of it from the FAA's Aircraft Certification Service, Policy & Innovation Division (P&I) (or another FAA employee designated by the P&I Division).
- (32) Test Witnessing:** The FAA P&I (or another FAA employee designated by the P&I Division) must witness the test and data collection required by this rule for the results to be valid for certification. Other acoustic focalists from FAA's Aircraft Certification Office and Acoustic Engineer(s) from the Office of Environment and Energy or Volpe National Transportation Systems Center may also be present to observe the tests.
- (33) Test Report Preparation and Approval:** The applicant must prepare a report that includes all of the findings and data required under this rule. The report must be approved by the FAA P&I Division (or another FAA employee designated by the P&I Division) as a part of the aircraft certification record.

Issued in Washington, DC.

Kevin Welsh,

Executive Director, Office of Environment and Energy.

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